What we claim is:

1. An optical structure comprising an interface between a first optical material and a second optical material each of which comprises a polymer, the first optical material comprising a polymer-inorganic particle blend, wherein the blend comprises inorganic particles that, when isolated, are electrical insulators or electrical conductors.

2. The optical structure of claim 1 wherein the two materials differ in values of index-of-refraction between each other by at least about 0.005.

3. The optical structure of claim 1 wherein the two materials differ in values of index-of-refraction between each other by at least about 0.1.

4. The optical structure of claim 1 wherein the polymer-inorganic particle blend has a non-linear optical response.

5. The optical structure of claim 1 wherein the polymer-inorganic particle blend comprises a polymer-inorganic particle mixture.

6. The optical structure of claim 1 wherein the polymer-inorganic particle blend comprises a polymer-inorganic particle composite.

7. The optical structure of claim 1 wherein the polymer inorganic-particle blend comprises inorganic particles comprising elemental metal or elemental metalloid, i.e. un-ionized elements, metal/metalloid oxides, metal/metalloid nitrides, metal/metalloid carbides, metal/metalloid sulfides or combinations thereof.

8. The optical structure of claim 1 wherein the polymer inorganic-particle blend comprises a polymer selected from the group consisting of polyamides (nylons), polyimides, polycarbonates, polyurethanes, polyacrylonitrile, polyacrylic acid, polyacrylates, polyacrylamides, polyvinyl alcohol, polyvinyl chloride, heterocyclic

polymers, polyesters, modified polyolefins, polysilanes, polysiloxane (silicone) polymers, and copolymers and mixtures thereof.

9. The optical structure of claim 1 wherein the second optical material comprises a polymer-inorganic particle blend.

10. The optical structure of claim 1 wherein the second optical material comprises no more than about 5 weight percent inorganic particles.

11. The optical structure of claim 1 wherein the second optical material comprises at least about 10 weight percent inorganic particles.

12. The optical structure of claim 1 wherein the first optical material comprises at least about 10 weight percent inorganic particles.

13. The optical structure of claim 1 wherein the first optical material comprises at least about 25 weight percent inorganic particles.

14. The optical structure of claim 1 wherein the inorganic particles have an average particle size of no more than about 1 micron.

15. The optical structure of claim 1 wherein the inorganic particles comprises metal/metalloid oxide particles.

16. A structure comprising an interface between a first material and a second material each of which comprises a polymer, the first material comprising a polymer-inorganic particle composite, wherein the composite comprises inorganic particles that are electrical semiconductors or electrical conductors and wherein the inorganic particles have an average particle size of no more than about 1 micron.

17. The structure of claim 16 wherein the inorganic particles are electrically conducting.

18. The structure of claim 16 wherein the first material is an optical material.

19. The structure of claim 16 wherein the second material is an optical material.

20. The structure of claim 19 wherein the first material and the second material is an optical material.

21. The structure of claim 16 wherein the inorganic particles have an average particle size of no more than about 500 nm.

22. The structure of claim 16 wherein the inorganic particles have an average particle size of no more than about 100 nm.

23. The structure of claim 16 wherein the inorganic particles comprises metal oxide particles.

24. A material comprising a polymer-inorganic particle blend, wherein the blend comprises inorganic particles that are electrically conducting and wherein the blend is transparent to visible light at a thickness of 100 microns.

25. The material of claim 24 wherein the polymer-inorganic particle blend comprises a polymer-inorganic particle composite.

26. The material of claim 24 wherein the inorganic particles comprise elemental metal.

27. The material of claim 24 wherein the inorganic particles comprise elemental silver.

28. A display comprising an electrode, the electrode comprising the material of claim 24.

29. A reflective display comprising liquid crystal dispersed within a polymer-inorganic particle blend wherein the blend is an optical material.

30. The reflective display of claim 29 further comprising two transparent electrodes and wherein the polymer-inorganic particle blend is located between the transparent electrodes.

31. The reflective display of claim 30 wherein a black absorbing is located on an opposite side of a transparent electrode relative to the polymer-inorganic particle blend.

32. An interconnected optical structure comprising a first optical channel, a second optical channel and an optical interconnect optically connecting the first optical channel and the second optical channel, the optical interconnect comprising a polymer-inorganic particle blend.

33. The optical structure of claim 32 wherein the first optical channel and the second optical channel have different indices-of-refraction and wherein the optical interconnect comprises an index-of-refraction intermediate between the indices-of-refraction of the first optical channel and the second optical channel.

34. The optical structure of claim 33 wherein the optical interconnect has a gradient in index-of-refraction to provide a monotonic change in index-of-refraction from the first optical channel to the second optical channel.

35. The optical structure of claim 34 wherein optical interconnect comprises a plurality of polymer-inorganic particle blends located adjacent each other along an optical path and wherein the gradient in index-of-refraction comprises a step-wise change in index-of-refraction.

36. The optical structure of claim 35 wherein the plurality of polymer-inorganic particle blends comprise at least two blends that differ by particle loading.

37. A periodic structure comprising approximately periodic index-of-refraction variation, wherein the structure comprises a first polymer-inorganic particle blend and a second optical material interspersed between regions with the polymer-inorganic particle blend, wherein the second optical material is selected from the group consisting of a second polymer-inorganic particle blend, a polymer and a non-polymer inorganic material.

38. The periodic structure of claim 37 wherein the period repeats at least about 3 times in one dimension.

39. The periodic structure of claim 37 wherein the period in one dimension is from about 20 nm to about 10 microns.

40. The periodic structure of claim 37 wherein the polymer-inorganic particle blend comprises a polymer-inorganic particle composite.

41. The periodic structure of claim 37 wherein the periodic structure comprises a photonic crystal.

42. The periodic structure of claim 37 wherein the periodic structure has a periodicity in one dimension.

43. The periodic structure of claim 37 wherein the periodic structure has a periodicity in two dimensions.

44. The period structure of claim 37 wherein the periodic structure has a periodicity in three dimensions.

45. The periodic structure of claim 37 wherein the structure has a defect in the periodicity.

46. The periodic structure of claim 37 wherein the polymer-inorganic particle blend changes index-of-refraction in response to an external stimulus.

47. A tunable optical filter comprising the periodic structure of claim 46 with a periodicity in one dimension.

48. A photonic crystal structure comprising a periodic array of a polymer-inorganic particle blend that is interspersed with an optical material.

49. The photonic crystal structure of claim 48 wherein the polymer-inorganic particle blend comprises a polymer-inorganic particle composite.

50. The photonic crystal structure of claim 48 wherein the polymer-inorganic particle blend and the optical material differ in index-of refraction by at least about 0.1 index units.

51. The photonic crystal structure of claim 48 wherein the polymer-inorganic particle blend and the optical material differ in index-of refraction by at least about 0.5 index units.

52. The photonic crystal structure of claim 48 wherein the periodicity has a defect.

53. An optical structure comprising an interface between a uniform optical inorganic material and an optical polymer-inorganic particle blend, wherein the blend comprises inorganic particles that are electrical insulators or electrical conductors.

54. The optical structure of claim 53 wherein the polymer-inorganic particle blend comprises a polymer-inorganic particle composite.

55. A display device comprising a layer of an optical polymer-inorganic particle blend that forms a visible portion of the display, wherein the blend comprises inorganic particles that are electrical insulators or electrical conductors.

56. The display device of claim 55 wherein the polymer-inorganic particle blend comprises a polymer-inorganic particle composite.

57. The display device of claim 55 wherein the blend comprises inorganic particles that are phosphors.

58. The display device of claim 55 wherein the inorganic particles are electrical conductors.

59. An optical device comprising a polymer-inorganic particle blend wherein the blend comprises inorganic particles that exhibit non-linear optical properties.

60. The optical device of claim 59 wherein the polymer-inorganic particle blend comprises a polymer-inorganic particle composite.

61. The optical device of claim 59 wherein the blend comprises inorganic particles comprises an inorganic composition with non-linear optical properties selected from the group consisting of $KTaO_3$, $K(Ta,Nb)O_3$, YVO_4 cadmium sulfide, cadmium

selenide, indium phosphide, lithium niobate, barium titanate combinations thereof and doped versions thereof.

62. A light absorbing device comprising a first electrode and a polymer-inorganic particle blend arranged in a periodic structure, wherein the periodic structure absorbs electromagnetic radiation at a desired frequency.

63. The light absorbing device of claim 62 wherein a potential is generated at the electrode as a function of the light absorbed by the periodic structure.

64. The light absorbing device of claim 62 further comprising an electron accepting material and a transparent electrode in which light absorbed by the periodic structure induces a current between the first electrode and the transparent electrode.

65. An electromechanical structure comprising a pair of electrodes and a polymer-inorganic particle composite wherein application of a voltage to the electrodes results in a deflection of a portion of the electromechanical structure.

66. The electromechanical structure of claim 65 further comprising a mirror or partial mirror.

67. A tunable optical device comprising the electromechanical structure of claim 65.

68. The tunable optical device of claim 67 further comprising a first mirror or partial mirror and a second mirror or partial mirror.

69. The tunable optical device of claim 67 further comprising a first mirror or partial mirror, a second mirror or partial mirror and an amplification material between the first and second mirror or partial mirror, wherein the tunable optical device functions as a tunable laser.

70. A method for producing an interface between a first material and a second material with each material comprising a polymer and with at least one of the materials comprising a polymer-inorganic particle blend, the method comprising coextruding a first optical material in contact with a second optical material to form an interface between the first material and the second material.

71. A method for producing an interface between a first material and a second material with each material comprising a polymer and with at least one of the materials comprising a polymer-inorganic particle blend, the method comprising spin-coating the first material on top of a layer of the second material to form an interface between the first material and the second material wherein the first material does not dissolve the second material in the time frame of the spin coating process.

72. The method of claim 71 further comprising thermally curing the first material following the spin-coating.

73. The method of claim 71 further comprising ultraviolet curing of the first material following the spin-coating.

74. The method of claim 71 wherein the first material comprises a solution/dispersion and the method further comprising removing the solvent/dispersant.

75. A method for producing an interface between two optical materials differing in value of index-of-refraction between each other by at least about 0.005, the method comprising implementing a self-assembly process with a polymer/inorganic particle blend to form a first optical material and locating a second optical material in contact with the blend to form the interface.

76. The method of claim 75 wherein the second optical material is placed on a surface prior to the self-assembly wherein the self-assembly process contacts the particle-inorganic particle blend with the second optical material.

77. The method of claim 75 wherein the second optical material is deposited after the self-assembly process to form the interface.